

<p>Project Proposal (Stage 0) for ISO TC184/SC4 N728</p> <p>Preliminary Work Item: Process Plant Operations &amp; Maintenance</p>
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## 1. Title of Proposal

Preliminary Work Item Proposal - Process plant operations and maintenance

## 2. Submission Date

June 10<sup>th</sup>, 1998

## 3. Nominator

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## 6. Scope and functional requirements:

The scope of this Preliminary Work Item (PWI) is to investigate requirements for standards for (exchange,) sharing and integration of plant operations and maintenance, the capabilities of SC4 standards to support these requirements and to propose modifications and/or extensions to current SC4 standards to meet these requirements.

The purpose of the PWI is to develop the framework by investigating and analyzing the procedures, methodologies and specifications for applications to enable complete, consistent data use and sharing between all operational functions within the enterprise. The PWI will focus on the requirements of Plant Operations and Maintenance, but will recognize and take into consideration the needs of other relevant life-cycle activities. Economic, safety and environmental considerations demand that this information is available to operators, managers of production facilities, and regulatory bodies in a consistent, integrated form. This requirement can be satisfied by standards that prescribe the structure and meaning of data that is shared by organizations and disciplines involved in all operational activities.

The PWI will investigate the sharing and integration of operational data, investigate the need for standard reference data libraries and common activity model, and to consider the requirements for additional Parts of existing SC4 standards. The proposed extensions to the SC4 standards will include plant operations and the integration and sharing of operational data and be consistent with existing standards such as ISO 15926 and ISO 10303 (STEP), including:

1. real time and historian data for process plant operation
2. maintenance
3. start up, normal steady state operation and shut down
4. monitoring
5. control

6. optimisation
7. abnormal situation management

Furthermore, the PWI will also investigate the following business data and functions that significantly impacts day-to-day operations:

1. decision analysis and support systems
2. business data
3. planning and scheduling
4. procurement

The PWI is being proposed to investigate and define new Part(s) as extensions to the specifications of ISO SC4 standard conceptual data model(s) and a methodology for defining standard reference data (“class libraries”). These new component Part(s) will enable the implementations of standard repositories for process plant operations and the procurement of systems that support such repositories.

This PWI proposal is submitted for approval by SC4 to carry out a stage 0 planning project to investigate the need for additional data models, standard reference data libraries, common glossary, common activity model and to consider the requirements for additional Part(s) of the applicable SC4 standards:

- ◆ Additions to the data model (definition and scope)
- ◆ Modifications to data model to allow flexibility to incorporate additional Part(s)
- ◆ Scope and definition of common activity model
- ◆ Additional reference data
- ◆ Scope and definition to generate common glossary
- ◆ Assess the need for real-time implementation forms
- ◆ Document sample usage scenarios (generic and domain specific)
- ◆ Plan and report next phases of work leading onto Operations New Work Item Part(s) to SC4 standard.

In addition, the relevance and industry need for standard reference data libraries, common glossary, common activity model will be investigated and reported. Items to be investigated include:

- ◆ Establishing a common framework, with specification of semantics and transactions, across the process plant "standards and specifications". The PWI teams will liaise with established SC4 groups.
- ◆ Mappings to SC4 standard Application Protocols and other relevant standards for data exchange and access

## 7. Proposed PWI Activities

The objective of this PWI is to first clarify the tasks of each plant operation and maintenance activities and the relationships between them and to analyse the data used by individual activities and/or shared by several activities. This will be done based on the existing work such as PIEBASE, EPISTLE, UML, etc. The PIEBASE<sup>1</sup> Activity Model will be used as the basis to describe the activities and information flows

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<sup>1</sup> PIEBASE (the **P**rocess **I**ndustries **E**xecutive for achieving **B**usiness **A**dvantage using **S**tandards for data **E**xchange). The PIEBASE Activity Model describes the activities and information flows related to the generation, and use of information needed to conduct the core business and to provide the context for the detailed activity models for the Process Plant Application Protocols.

related to the generation and use of information needed to conduct the core business and to provide the context for the detailed activity model(s) for the process plant new Part(s). Both EPISTLE model and UML will form the basis for the data (information) modelling. Based on these, attention will be directed to the abstraction of generic activities and data structures that will provide a basis for building up efficient activity models and data models.

The PWI pays attention to the domain activity analysis, which will lead to a better classification of these activities based on the data they use and/or share. To best support these activities, the data models will be defined in several levels of abstraction to decompose a plant into several functional "islands". This makes it easier to carry out multiple activities more efficiently. Based on this, a new distributed engineering environment can be built, which will support better integration of new application components. These ideas will extend the existing effort and bring benefit to both end users and software vendors.

## 8. Evidence of Industry need

To remain competitive in the global market, process industries must demonstrate good manufacturing advantage in terms of high efficiency, high quality product, short product delivery time, flexible and fast response to market and feedstock change, safety, reliability, clean environment, etc. The achievement of these goals requires improving the efficiency in all levels of the chemical enterprise. One of the essential approaches is to take advantage of the significant progress in information technology and build better database systems.

Implementing and sharing product databases are for the efficient execution of relevant manufacturing activities. These activities are conducted by humans and/or by computer software tools. This means, that both humans and software tools share the common data through the product databases. Therefore, it is imperative to use standard data structures (data models) in building such databases.

This is concluded from the Advanced Operation Support System Development Project of Japan Energy Corporation's during the past three years.

## 9. Position in SC4 architecture

The requirements for sharing and integration of lifecycle asset data established by the hydrocarbon industries are broader in scope than those that are capable of satisfaction by the existing ISO TC184/SC4 standards. In particular, the ISO 15926 results to date clearly exhibit the need be able to share and integrate data in managed environments with standardized interfaces. While STEP (ISO 10303) application protocols provide suitable specifications for such interfaces, they are unsuited for integrating and managing asset life cycle data in a standard manner.

The PWI will investigate the feasibility of extending the capabilities of the SC4 industrial standards using the common infrastructure that is already employed by ISO 10303 "STEP", ISO 13584 "PLIB", ISO 15531 "MANDATE", and ISO 15926. The proposed stage 0 planning project will work with other projects within SC4 that share this common technical approach. These include the work of the engineering analysis planning project (WG3 T9), PWI Product Life Cycle Support (WG3 T8), the shipbuilding group (WG3 T12) and the technical architecture-working group (WG10).

The methods and techniques that will be investigated as part of this PWI will include the Generic Framework under EPISTLE<sup>2</sup> and may be a contribute to the overall architecture for industrial data that is being developed by ISO TC184/SC4/WG10.

## 10. Overlap and relationships to existing SC4 work

It is anticipated that developments leading from the PWI will be applied in the hydrocarbon processing industries (oil and gas exploration and production, pipeline transmission, refining, petrochemical and power/utility). It is expected that the results from this work will have far broader impact covering many more industries. Currently, oil and gas and refining companies are actively involved in the development of this preliminary work item. Industry co-operation, participation and technology "take-up" is fundamental to the success of this work.

There is already a considerable body of International Standards that complement or contribute to the PWI results. In particular, there are a number of ISO 10303 Application Protocols that standardize mechanisms for exchange of data in domains that are of interest to the hydrocarbons process plant industries and overlap with the scope of the ISO 15926 model and the proposed new Part(s) under this PWI. These include:

- ◆ ISO 10303-208: Life cycle product change process
- ◆ ISO 10303-221: Functional data and schematic representation for process plants
- ◆ ISO 10303-227: Plant spatial configuration
- ◆ ISO 10303-231: Process engineering data: Process design and process specifications of major equipment

Each of these application protocols represents a possible input/output mechanism for the operations life-cycle data management environment that will be supported by the new Part(s) proposed under this PWI. The overlap (areas of commonality) with the STEP ISO 10303 APs (such as AP221, AP231, etc) will be investigated as part of the PWI scope.

There is some potential overlap with Ship operation NWI. The potential overlap will be investigated and reported as part of the deliverable of this PWI. Information exchange between the Ship Operation NWI teams is currently in progress.

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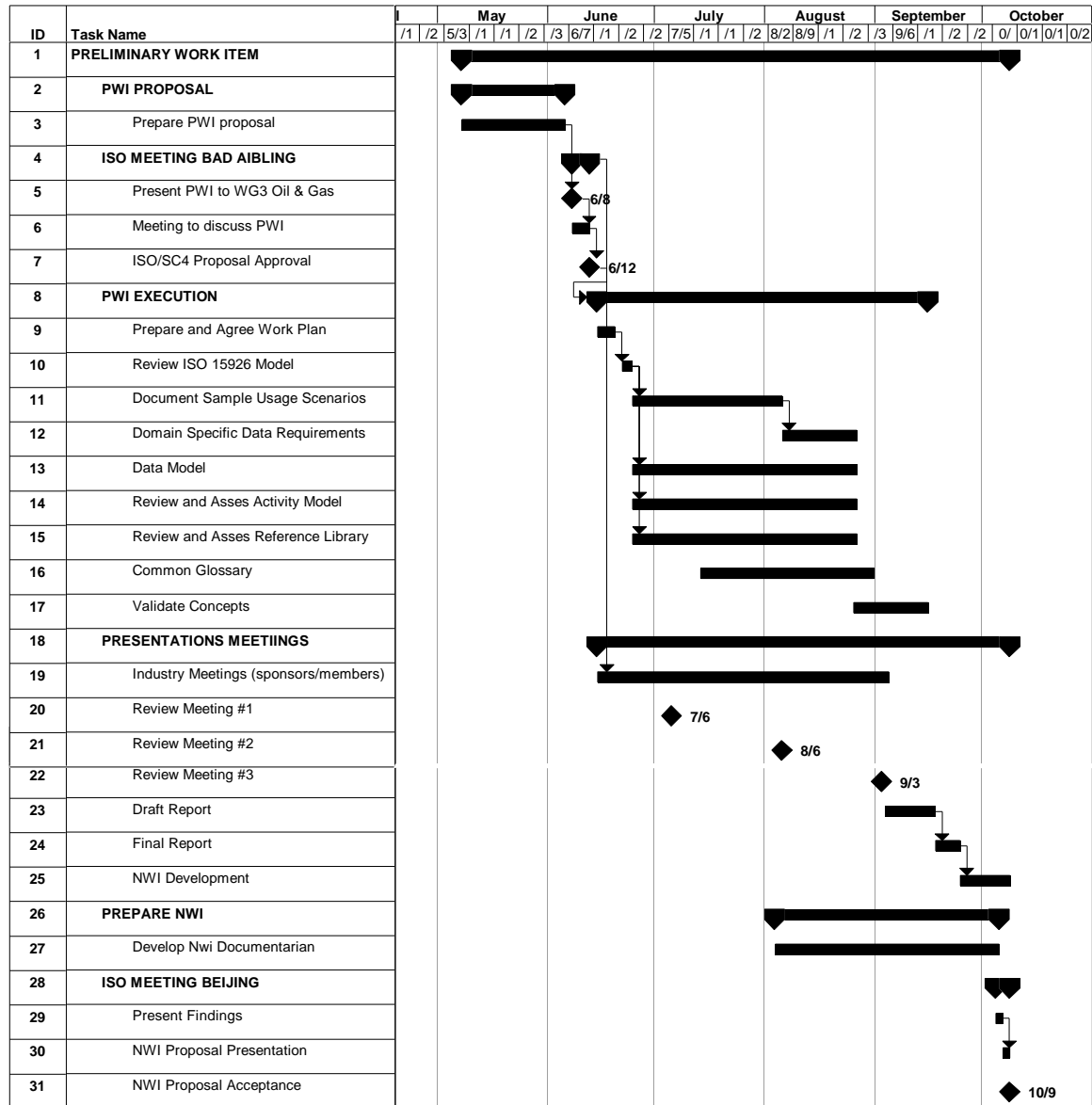
<sup>2</sup> Generic Framework for conceptual data modelling developed within EPISTLE, the European Process Industries STEP Technical Liaison Executive. The work of EPISTLE is a major input to the activities of ISO TC184/SC4/WG10.

## 11. Current participants and committed resources for developing the NWI

Tetsuya Wada	Chairperson	JEC, JAPAN
<b>Managing team</b>		
Dr. Graham Bird	Project manager	ASI, USA
Dr. Norman Smothers	Project administrator	ASI, USA
<b>Technical team:</b>		
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N. K. Nakada	Technical Co-lead	NKD, Japan
Amish Sabharwal	Technical modeller	ASI, USA
Dr. Hua Sheng Li	Technical developer	CCS, Japan
Steven Sussman	Technical advisor	ABB Simcon, USA
Philip Morrow	Technical developer	ABB Simcon, USA
Dr. Ai-Dong Yang	Technical developer	ASI, USA
Others to be announced		

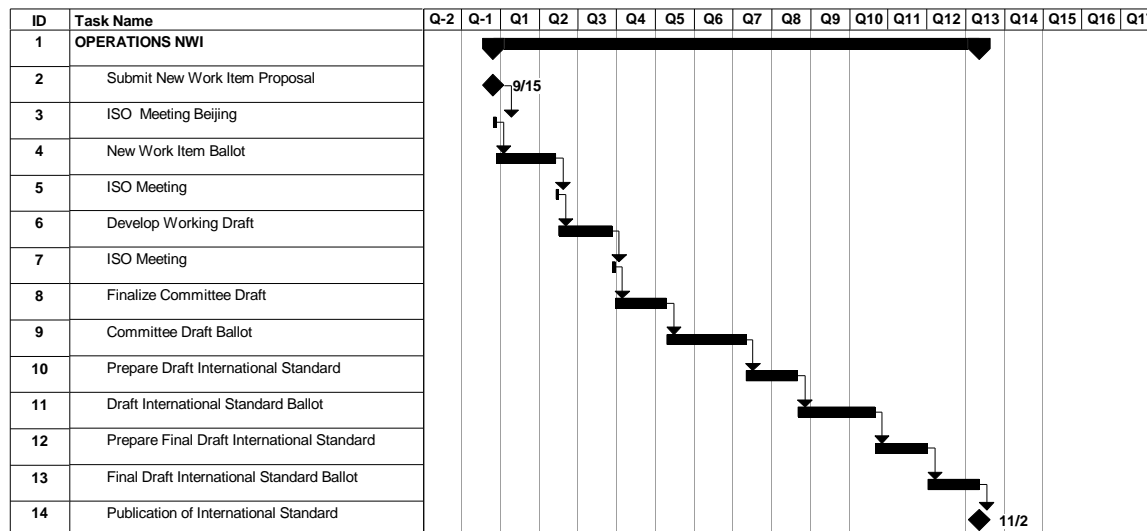
## 12. Schedules

### 12.1 Schedule for delivering PWI



## 12.2 Schedule for delivering NWI

Approximate Target dates for development of the NWI and publication as an International Standard are listed below. A detailed schedule will be developed as part of the PWI.



## 13. Contact Information

### Organizational

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## 14. Appendix 1

Business case for operations standardisation see document under ([www.asi96.com](http://www.asi96.com))

## 15. Appendix 2

### 15.1 Relationships to activities of other international bodies:

The PWI team is in the process of setting up an active liaison with the following STEP groups:

PlantSTEP	PDXI
EPISTLE	POSC
SPI-NL	OPC (Ole for Process Control Foundation)
PISTEP	Others to be identified as part of the phase 0 project

### 15.2 Support Group - Japan CIM Group

The CIM research group's formal name is in Japanese: "CIM Kenkyuu-kai", where "Kenkyuu" means Research and "kai" means Group. Therefore the group is known as "CIM Ken", with CIM standing for Computer Integrated Manufacturing. Dr. Togino and his supporters founded the CIM Research Group almost ten years ago and they represent engineering managers from manufacturing industries. It has been promoted and administrated by DEC-Japan, and DEC-Japan has partly sponsored its activities. It has just become one of the SIGs (Special Interest Groups) within DECUS (DEC Users Group). It is anticipated that this group will provide input during phase 0.

"CIM Ken"'s mission is to provide its members with opportunities for gathering, exchanging, and studying information from versatile and interdisciplinary industries, which are useful for its members. In Japanese it is described as "I-Gyoushu-KouRyuu" i.e. making business/research friends with different industry people.

Work Groups within "CIM Ken" are:

- 1)SIG on CALS
- 2)SIG on IDEF
- 3)SIG on OOT(Object Oriented Technologies)

The member corporations are:

Meiden Software Corp.	JGC Business Service Co., Ltd.
JGC Information Systems Co., Ltd.	NSK Ltd.
Asahi Chemical Industry Co., Ltd.	Taisei Prefab Construction Co., Ltd.
Sumitomo Metal Industries, Ltd.	Nippon Zeon Co., Ltd.
Sumitomo Metal Systems Development Co., Ltd.	Digital Equipment Corporation Japan
Intelligent Management System International Co., Ltd.	Mitsubishi Electric Corp.
Komatsu Ltd.	

## 15.3 Prospective Japanese Companies and Organizations:

The Operations PWI team will establish contact and solicit input from Japanese companies (partial listing follows).

Asahi Chemical Industry	Asahi Engineering
Asahi Glass	Bentley Systems
Chisso Engineering	Chiyoda Corporation
Dainippon Ink and Chemicals	Denki Kagaku Kogyo
Ebara Corporation	Fuji Electric
Fujikin Incorporated	Fujitsu
Hitachi	Hitachi Plant Engineering & Construction
Human Media Creation Center/KYUSHU	Idemitsu Engineering
Isikawajima-Harima Heavy Industries	Japan Energy Corporation
JGC Corporation	Kajima Corporation
Kawasaki Heavy Industries	Kitamura Valve Mfg.
KITZ Corporation-Simsci Japan	Kumagai Gumi
Kurita Water Industries--Nippon Steel Corporation	Kyokuto Boeki Kaisha
Matsushita Electric Industrial--Showa Denko	Mitsubishi Corporation
Mitsubishi Electric Corporation	Mitsubishi Heavy Industries
Mitsubishi Research Institute	Mitsui Petrochemical Industries
Mitsui Toatsu Chemicals	Mitsubishi Chemical
MUTOH Industries	Niigata Engineering
Nippon Petrochemicals	NKK Corporation
Organo Corporation	Sanko Engineering Corporation
Sankyu	Shimizu Corporation
Sumitomo Chemical	Sumitomo Chemical Engineering
Takada Corporation	Takenaka Corporation
TLV	Toshiba Corporation
Toyo Construction	Toyo Engineering
Ube Industries-Mitsui Engineering & Shipbuilding	Yamatake-Honeywell
Yasukawa Electric Corporation	Yokogawa Electric
Zeon Engineering	

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Title: 1. Proposed New Work Item Summary Sheet  
Subject: r-96-031 version 6  
Author: Nils Sandsmark  
Keywords: draft  
Comments:  
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Change Number: 2  
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Last Saved By: Lisa Phillips  
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Number of Pages: 11  
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Number of Characters: 13,560 (approx.)